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Research article

Association between daily commute and subjective health complaints among the office workers in an urban community

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ABSTRACT

Purpose: To determine the prevalence of subjective health complaints (SHC) among metropolitan office commuters and to investigate the relationship between SHC and socio-demographic, commuting, and work-related factors.

Methods: The participants in this cross-sectional study were 628 full-time bank employees in Dhaka. One-month prevalence was determined using the SHC inventory scale. Internal consistency was determined using factor analysis. The discrepancy between socio-demographic and SHC was summarized using descriptive analysis. To discover factors related to SHC, random logistic regression intercept models were employed.

Results: Sadness (54.0 percent), low back pain (36.6 percent), anxiety (34.2 percent), pseudo-neurological disorders (26.6 percent), and musculoskeletal pains (20.2%) were the most common health complaints. The relationship between traffic congestion and SHCs was found to be statistically significant ($p = 0.001$) for the majority of complaints. According to multilevel analysis, long-distance office commuters were 7.29 times more likely than short-distance commuters to suffer from musculoskeletal pains (AOR = 7.29, 95% CI = 3.58–15.21). Furthermore, we discovered that long-distance commuters were 2.72 times more likely to complain about flu (AOR = 2.72, 95% CI = 1.22–6.27), 1.56 times more likely to complain about pseudo-neurological problems (AOR = 1.56, 95% CI = 0.84–2.92), and 1.88 times more likely to complain about gastrointestinal problems (AOR = 1.88, 95% CI = 0.69–5.41).

Conclusion: In Dhaka, we found a high prevalence of health concerns among full-time bank personnel. A significant prevalence of health complaints was related to traffic congestion, long commutes, and use of public transportation. Reducing daily commuting time, switching modes of transportation, and avoiding traffic congestion could help to alleviate the burden of health concerns experienced by regular office commuters.

1. Introduction

Recent changes in the job sector from farming or manual work to service-related work draw more population to urban settings globally [1]. Bangladeshi large cities and other Asian cities are not out of this trend. As a result, Dhaka, Bangladesh's capital, has become one of the densest hubs for office workers. In Dhaka city, more employees, particularly women, are involved in service-related work than ever before [2]. A large number of these working populations in the cities need daily commute. At the same time, studies suggested that daily commute is associated with SHC [3, 4]. SHC are complaints without objective pathological signs [4, 5]. Although SHC is common everyday symptoms, it can reach to a peak level that causes office absenteeism [6].

Overall, commuting takes up a significant amount of time during the day, resulting in less physical exercise, leisure time, and quality time with family members [7]. Commute related stress, anxiety, sleep disturbance, and poor performance at work is very common to the working population [8, 9, 10]. Additionally, pathological disorders such as metabolic, cardio-respiratory, psychological disorders are more prevalent among daily commuters [11, 12]. Studies observed short sleeping time among

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daily commuters and which make their family life harder than others [13, 14, 15]. Moreover, commute ranked the least enjoyable daily activity carried out by working people in a day [16].

The daily commute is a significant mental and physical hardship for many office workers, resulting in health concerns. Unpredictability, a lack of control over the travel, and an overcrowded transport, on the other hand, are linked to unfavorable health outcomes for everyday commuters [17]. Traffic congestion also has a strong negative association with the health outcome of commuters [18]. Previous studies found a considerably high prevalence of SHC among the urban population [4, 19, 20]. Dhaka is the number one traffic-congested city in the world where roads are unable to handle a large number of vehicles during peak hours. Public transport in Dhaka city is frequently overloaded and crowded due to high passenger pressure. Thus the regular office goers face the pains-taking journey to go and from the office every working day in Dhaka city.

Commute related sick leave is found very common among American, Swedish, and Italian office workers [17]. Women have reported SHC as well as take sick leave due to commuting more frequently [4, 17]. Nonetheless, most of the previous studies that measure the SHC of the daily commuters have conducted in the cities of developed counties where the transportation system is well organized. Little is known about the health of commuters in the high densely populated cities of developing countries where office commuters struggle everyday with transportation and unorganized transportation system. To the best of our knowledge, there has been no research done on the prospective health implications of regular commuting in a megacity such as Dhaka. The goal of the study was to identify the prevalence of subjective health complaints among office workers in Dhaka, as well as the relationship between daily commute-related and job-related factors and health complaints.

2. Materials and method

2.1. Participants

A cross-sectional study was conducted using a self-administered questionnaire to interview full-time bank employees in Dhaka city between December 2018 and May 2019. We chose 32 banks in Dhaka to collect data from full time employees. The study included both male and female employees between the ages of 18 and 59 who matched the following inclusion criteria: (i) had been working regularly for at least 1 year, (ii) had lived in Dhaka city for at least 1 year, (iii) not a pregnant or lactating mother, (iv) not critically ill or have no chronic inflammatory pain such as rheumatoid arthritis, ankylosing spondylitis, gout, etc., (v) who gave consent to participate in the study.

A convenient sampling technique was used to select the bank employees from banks following the STROBE guideline. The minimum necessary sample size for the study was calculated based on a 95% confidence interval (CI) and assuming the prevalence of SHC among full-time employees as 35%. We calculated the minimum required sample as 546 by considering a 4% marginal error.

The 923 bank workers who satisfied the eligibility criteria were given a paper-based questionnaire at work and asked to complete it and return it within seven days. Six hundred and fifty-two people returned the questionnaire, but six hundred and twenty-eight persons completed the entire questionnaire, and this complete data was included in the analysis.

2.2. Measurements

2.2.1. Socio-demographic measurements

By using a semi-structured questionnaire, data on socio-demographic factors, such as age, gender, body mass index (calculated based on weight and height), and marital status were collected. Behavioral factors including sleep arrangements (firm or foam mattresses), smoking habits (current, previous or never), and physical activities of the respondents were collected. The response of sleep arrangement by a firm or foam mattress was subjective about the feel of rigidness about the mattress. Physical activities were calculated based on the metabolic equivalents (MET minutes/week) scale. In this study, the levels of physical activity of the respondents were measured by asking about their weekly activities during work and leisure time, activities related to transport, and time spent in a sedentary position. MET-minute was calculated according to the STEPS protocol, and physical activity was categorized into: moderate to vigorous, light, and sedentary activity [21]. We also collected data on occupational factors, including the length of employment and average daily working hours. The crowding was calculated by dividing the number of family members in the house by the number of bedrooms. We categorized the in-housing crowding in three groups: $\leq$1.5, 1.5–2.0, and $>$2.0. Data on common chronic illness (Diabetes and Hypertension) from the employees were also collected.

2.2.2. Commute and work-related measurements

The participants were asked about: (1) average travel time to the office (minutes), (2) commuting distance (km) to the workplace from home (measured by using Google map), (3) commuter transportation and (4) overall subjective traffic congestion experience (yes/no). For work-related factors, we consider job duration in the year (experience) and daily working hours. 8–9 h per day work considered as regular office hour and $>$9 h was considered as extended.

2.3. Subjective health complaints

In this study, the health complaints experienced during the last 30 days was measured by using Eriksen et al.'s subjective health complaints inventory [22]. The questionnaire has been validated and has satisfactory validity and reliability [4, 5, 6, 22]. The inventory consists of 29 items, for which the severity of each complaint is scored on a four-point scale ranging from "no complaints" (0) to "severe complaints" (3). In our study, we use four subgroups: musculoskeletal pain (headache, migraine, neck pain, lower back pain, upper back pain, arm pain, shoulder pain, and leg pain); pseudo-neurology (anxiety, depression and sleeping problems); gastrointestinal problems (stomach discomfort, ulcer, and non-ulcer dyspepsia); and flu (cough and cold). The employees were asked to rate the occurrence of SHC using the 16 items with four answering categories ("no complaint", "only once/a little", "of short duration/some", "frequently/serious"). Employees who answered, "No complaint", "only once/a little" on all questions were classified as having no SHC. Those who answered "of short duration/some" or "frequently/serious" for one or more locations were classified as having SHC overall.

2.4. Ethical consideration

The ethical committee of the Bangladesh University of Professionals (2019/273) and IRB of North South University (NSU-IRB-2019/54) approved the study. An introduction detailing the objectives of the study and guaranteeing anonymity and confidentiality of data were included in the questionnaire. After taking a written informed consent, the interview has been started. The participants were free to withdraw at any time without providing a reason.

2.5. Data analysis

We used the R 3.6.0 software to analyze the data. Variables on subjective health complaints were subjected to exploratory factor analysis using principal component analysis with varimax rotation and Kaiser Normalization. Factor loading $>$0.50 was selected as a cut-off value for inclusion, which was the same as that utilized by Wiklund et al. [20]. The specified cut-off ensures that the items included are relevant to the factors generated. Cronbach's alpha was used to assess dependability, with values of $>$0.6 indicating a high level of internal consistency. For each categorical variable, descriptive statistics were generated (presented as

frequencies and percentages). To further understand the data's multicollinearity, we ran a correlation analysis on the continuous independent variables. We used the "glmer" function from the "lme4" package of R to run the multilevel logistic model with a random intercept model with fixed slopes. The intercept differs by bank in this case. The adjusted odds ratios are used to report the findings (OR).

3. Result

3.1. Prevalence of SHC

Figure 1 depicts the prevalence of health complaints among 628 bank workers over a one-month period. Tiredness (54.0 percent) was the most common symptom, followed by 36.6 percent low back pain (LBP), 34.2 percent anxiety, 33.8 percent gas discomfort, and 32.0 percent sadness or depression; however, diarrhea (0.5 percent) and eczema (1.4 percent) were the least common health complaints. Subgroups such as pseudo-neurological disorders, musculoskeletal pains, fever, gastrointestinal difficulties, and allergies, on the other hand, had prevalence rates of 26.6 percent, 20.2 percent, 13.05 percent, 11.9 percent, and 7.32 percent, respectively.

3.2. Factor analysis

To determine the internal consistency of health complaints, we used a factor analysis. Table 1 summarizes the findings. Four components with eigenvalues greater than one emerged from a factor analysis of subjective health concerns. The first component (eigenvalue 2.13, Cronbach's alpha 0.731) was termed "musculoskeletal pain" and comprised of seven items (shoulder, neck, upper back, LBP, arm pain and headache, and migraine). The second component, called "flu," had an eigenvalue of 1.47 and a Cronbach's alpha of 0.571, and was made up of two items (cold-flu and coughing). "Pseudo neurology" was coined to describe the third element, which included anxiety, sadness/depression, and sleep issues (eigenvalue 1.67, Cronbach's alpha 0.711).

The "gastrointestinal problem" (eigenvalue 1.72, Cronbach's alpha 0.584) was the final factor, which included stomach discomfort and dyspepsia. The variation was explained 53.5 percent by components with an eigenvalue larger than one.

Fifteen items (chest pain, eczema, allergies, breathing difficulties, asthma, obstipation, diarrhea, gas discomfort, stomach pain, heartburn, dizziness, heat flushes, extra heartbeats, weariness, and leg pain during physical activity) could not achieve factor loading >0.5 and were thus eliminated.

3.3. Descriptive analysis

Table 2 and Table 3 provide the descriptive statistics of the participants' anthropometric and sociodemographic data, as well as their employment and commute-related factors. The 628 participants had an average age of 36.17 years. The majority of the study's participants were between the ages of 31 and 40 (57.2 percent). Male participants made up a larger percentage of the total (59.5 percent vs. 40.5 percent). The proportion of people with a normal BMI was somewhat greater (51.0 percent) than the total number of obese and overweight people. Whereas the majority of the participants in the study were married bank workers (82.3 percent). Only 17.7 percent of those who took part in the study were smokers, and 10.9 percent had comorbidities. However, 60.6 percent of bank employees fell into the category of light physical activists, according to MET calculations (Table 2). Approximately 60 percent of those who took part worked regular hours (8–9 h per day). Also, 33 percent of bank employees resided more than 9 km from their place of employment, and 29.8 percent took more than an hour to get to work. More than a third of those total participants (36 percent) indicated they commuted to work by public bus, while the another one-third (31 percent) claimed they commuted by Rickshaw. Despite the mode of transportation, more than half of the participants (55 percent) claimed they face traffic congestion on their way to work.

3.4. Anthropometric and socio-physical factors

Table 4 shows the results of descriptive analysis for anthropometric and socio-physical characteristics (at a 5 percent significant level). The researchers discovered a significant relationship between age groups and musculoskeletal complaints ($p = 0.044$). Although the connection between gender and flu was not statistically significant ($p = 0.56$), more males complained of flus than females. There is no relationship between BMI and any of the other health complaints. There was a statistically significant ($p = 0.019$) relationship between marital status and musculoskeletal aches, with married bank employees (60 percent) reporting higher musculoskeletal problems than unmarried bank employees (47 percent). Similarly, married respondents complained about stomach problems more than unmarried respondents (11.6 percent vs. 5.4 percent). In terms of comorbidity, there was no relationship between this

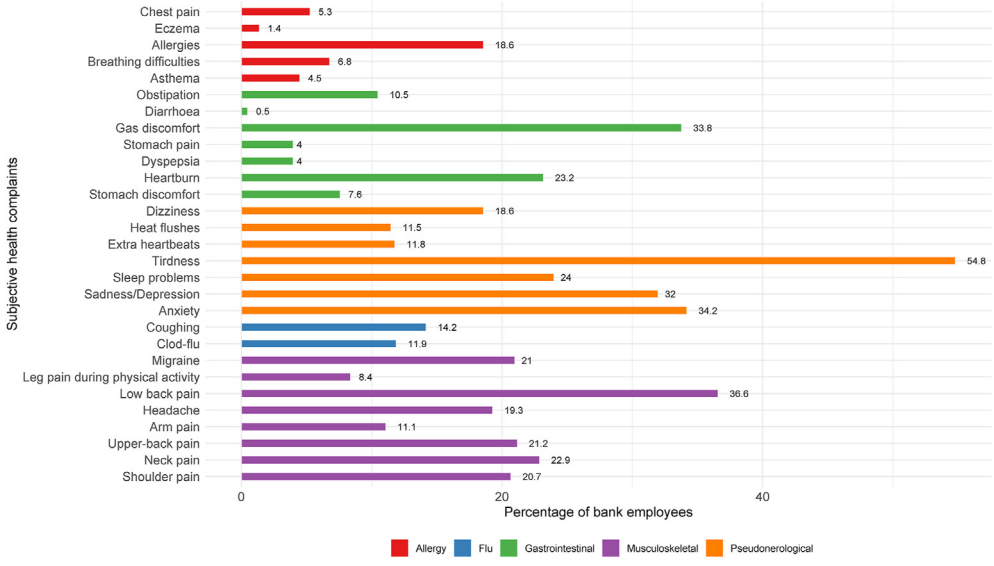

Figure 1. Subjective health complaints.

Table 1. Factor analysis using a rotated component matrix for subjective health complaints variables (factor loading >0.50 is cut-off point for inclusion).

Subjective Health Complaints	Factor 1	Factor 2	Factor 3	Factor 4
Musculoskeletal Pain	Eigenvalue 2.13 Cronbach's alpha 0.731			
Shoulder	0.77			
Neck	0.80			
Upper back	0.52			
Low back pain	0.51			
Arm	0.52			
Headache	0.61			
Migraine	0.53			
Flu		Eigenvalue 1.47 Cronbach's alpha 0.571		
Cold		0.56		
Coughing		0.67		
Pseudo Neurology			Eigenvalue 1.67 Cronbach's alpha 0.711	
Anxiety			0.81	
Sadness/depression			0.70	
Sleep problem			0.50	
Gastrointestinal Problem				Eigenvalue 1.72 Cronbach's alpha 0.584
Stomach discomfort				0.62
Dyspepsia				0.62

Table 2. Univariate analysis: Anthropometric and socio-demographic factors.

Factor	Categories	Total (%) within categories
Age	20–30	139 (22.1%)
	31–40	360 (57.2%)
	41–50	100 (15.9%)
	50+	28 (4.5%)
Gender	Male	373 (59.5%)
	Female	254 (40.5%)
BMI	Normal	320 (51.0%)
	Obese	38 (6.1%)
	Overweight	269 (42.9%)
Marital Status	Married	516 (82.3%)
	Unmarried	111 (17.7%)
Crowding	≤1.5	333 (53.1%)
	1.5–2	197 (31.4%)
	2+	97 (15.5%)
Sleeping mattresses	Firm bed	529 (84.4%)
	Foam bed	98 (15.6%)
Smoking habit	No	516 (82.3%)
	Yes	111 (17.7%)
Physical Activity	Sedentary	192 (30.6%)
	Light	380 (60.6%)
	Moderate to vigorous	55 (8.8%)
Diabetes/Hypertension	No	559 (89.1%)
	Yes	68 (10.9%)

factor and the majority of health complaints, although more comorbid respondents (19 percent) reported gastrointestinal difficulties than healthy respondents (10%), and the difference was statistically significant (p = 0.029).

Table 3. Univariate analysis: work and commute-related factors.

Factor	Categories	Total (%) within categories
Job duration (years)	≤5	216 (34.4%)
	6–10	207 (33.0%)
	10+	204 (32.6%)
Working hours/day	Extended (>9)	258 (41.1%)
	Regular (8–9)	369 (59.9%)
Average commute time to office (minutes)	≤15	119 (19.0%)
	16–30	166 (26.5%)
	31–60	155 (24.7%)
	>60	187 (29.8%)
Distance to office (Kilometer)	≥2	171 (27.3%)
	3–5	143 (22.8%)
	6–8	103 (16.4%)
	≤9	210 (33.5%)
Commuting mood	Bus	226 (36.0%)
	Car	60 (9.5%)
	Rickshaw	193 (30.8%)
	Walk/bicycle	84 (13.4%)
	Others (train, motorcycle, auto-rickshaw etc.)	64 (10.2%)
Experience of traffic congestions	No	283 (45.1%)
	Yes	344 (54.9%)

3.5. Work and commute related factors

In our study, participants were asked about their daily commute to work and the elements that influence their health. Descriptive analysis was used to examine the relationship between these characteristics and four health complaints subgroups. Table 5 summarizes the findings of the analysis at a 5 percent level of significance. When participants were asked if they encounter traffic congestion on their way to work, they were given two options: yes or no. We discovered a robust relationship between traffic congestion and categories of SHC. There was a statistically significant association between traffic congestion and musculoskeletal pains (p = 0.001), with 82 percent of those who experienced traffic congestion complaining about musculoskeletal pains while only 28 percent of those who did not experience traffic congestion complaining about musculoskeletal pains. The study also found a statistically significant association between traffic congestion and flu (p = 0.019), with the percentage of participants who replied yes to traffic congestion being much greater than those who said no (15 percent vs. 23 percent). There was also a robust relationship between traffic congestion and pseudo-neurology and gastrointestinal issues (p = 0.001 in both subgroups). In these circumstances, 60 percent of yes-answerers reported pseudo-neurological issues (vs. 40 percent of no-answerers), and the ratio for gastrointestinal issues was roughly 3:1 (15 percent yes vs. 5 percent no).

All categories of health complaints were significantly associated with commuting time to work. Long commuters complained more of musculoskeletal pains (p = 0.001), flu (p = 0.022), pseudo-neurology (p = 0.007), and intestinal problems (p = 0.001). Musculoskeletal pains (p = 0.001), pseudo-neurology (p = 0.007), and gastrointestinal problems (p = 0.006) all demonstrated a significant relationship with distance to office. However, commuting mode was associated with musculoskeletal problems (p = 0.001), while public bus passengers reporting higher musculoskeletal pains, flu, and pseudo-neurology.

In our investigation, we found a significant relationship between job length and musculoskeletal symptoms. Regular musculoskeletal pain complaints are more common in participants who worked for more than 6 years in banks (p = 0.006). Despite the lack of statistical relevance between employment duration and pseudo-neurology, participants with job durations of more than 10 years reported more health complaints (59 percent). On the other hand, 61 percent of participants who worked long

Table 4. Descriptive Analysis: Anthropometric and socio-physical factors.

Factor	Categories	Musculoskeletal pain		P-value*	Flu		P-value*	Pseudo-neurology		P-value*	Gastrointestinal problem		P-value*
		Yes (Row %)	No		Yes	No		Yes	No		Yes	No	
Age	20–30	72 (51.8)	67 (49.2)	**0.044**	28 (20.1)	111 (79.9)	0.587	66 (47.8)	72 (52.2)	0.226	11 (7.9)	128 (91.1)	0.246
	31–40	200 (55.6)	160 (44.4)		71 (19.7)	289 (80.3)		185 (51.4)	175 (48.6)		36 (10.0)	324 (90.0)	
	41–50	68 (68.0)	32 (32.0)		17 (16.8)	84 (83.2)		59 (58.4)	42 (41.6)		16 (15.8)	85 (84.2)	
	50+	19 (67.9)	9 (32.1)		8 (28.6)	20 (71.4)		18 (64.3)	10 (45.7)		3 (10.7)	25 (89.3)	
Gender	Male	205 (54.9)	168 (45.1)	0.185	60 (23.6)	194 (76.4)	0.056	203 (54.4)	170 (45.6)	0.230	30 (11.8)	224 (88.2)	0.457
	Female	154 (60.6)	100 (39.4)		64 (17.1)	310 (82.9)		125 (49.2)	129 (50.8)		36 (9.6)	338 (90.4)	
BMI	Normal	175 (54.7)	145 (45.3)	0.138	63 (19.7)	257 (80.3)	0.560	162 (50.8)	157 (49.2)	0.350	28 (8.8)	292 (91.2)	0.260
	Obese	27 (71.0)	11 (29.0)		10 (26.3)	28 (73.7)		24 (63.2)	14 (66.8)		6 (15.8)	32 (84.2)	
	Overweight	157 (58.4)	112 (41.6)		51 (18.9)	219 (81.1)		142 (52.6)	128 (47.4)		32 (11.9)	238 (88.1)	
Marital Status	Married	307 (59.5)	209 (40.5)	**0.019**	103 (19.9)	414 (80.1)	0.913	271 (52.4)	246 (47.6)	0.993	60 (11.6)	457 (88.4)	0.078
	Unmarried	52 (46.8)	59 (53.2)		21 (18.9)	90 (81.1)		57 (51.8)	53 (49.2)		6 (5.4)	105 (94.6)	
Comorbidity	No	318 (56.9)	241 (43.1)	0.685	105 (18.8)	454 (81.2)	0.118	287 (51.4)	271 (48.6)	0.261	53 (9.5)	506 (90.5)	**0.029**
	Yes	41 (60.3)	27 (39.7)		19 (27.5)	50 (72.5)		41 (59.4)	28 (40.6)		13 (18.8)	56 (81.2)	

Bold faces are significant at 5% significance level.
* p-value is calculated from chi-square test.

Table 5. Descriptive Analysis: Work and commute related factors.

Factor	Categories	Musculoskeletal pain		P-value*	Flu		P-value*	Pseudo neurology		P-value*	Gastrointestinal		P-value*
		Yes (Row %)	No		Yes (Row %)	No		Yes (Row %)	No		Yes (Row %)	No	
Job duration (years)	≤5	109 (50.5)	107 (49.5)	**0.006**	42 (19.4)	174 (80.6)	0.636	110 (51.2)	105 (48.8)	0.069	17 (7.9)	199 (91.1)	0.150
	6–10	116 (56.0)	91 (46.0)		45 (21.7)	162 (78.3)		98 (47.3)	109 (52.7)		21 (10.1)	186 (89.9)	
	10+	134 (65.7)	70 (34.3)		37 (18.0)	168 (82.0)		120 (58.5)	85 (41.5)		28 (13.7)	177 (86.3)	
Working hours/day	Extended (>9)	159 (61.6)	99 (38.4)	0.077	66 (17.8)	304 (81.2)	0.181	142 (55.3)	115 (44.7)	0.251	31 (12.0)	227 (88.0)	0.371
	Regular (8–9)	200 (54.2)	169 (45.8)		58 (22.5)	200 (77.5)		186 (50.2)	184 (49.8)		35 (9.5)	335 (90.5)	
Average commute time to office (minutes)	≤15	40 (33.6)	79 (66.4)	**<0.001**	18 (15.6)	97 (84.4)	**0.022**	51 (44.7)	63 (55.3)	**0.007**	9 (7.8)	106 (92.2)	**<0.001**
	16–30	55 (33.1)	111 (66.9)		29 (17.4)	138 (82.6)		75 (44.9)	92 (55.1)		5 (3.0)	162 (97.0)	
	31–60	116 (74.8)	39 (25.2)		26 (16.4)	133 (83.6)		89 (56.0)	70 (44.0)		25 (15.7)	134 (84.3)	
	>60	148 (79.1)	39 (20.9)		51 (27.3)	136 (72.7)		113 (60.4)	74 (39.6)		27 (14.4)	160 (85.6)	
Distance to office (Kilometer)	≥2	55 (32.2)	116 (67.8)	**<0.001**	29 (16.9)	143 (72.1)	0.331	74 (43.3)	97 (56.7)	**0.007**	9 (5.2)	163 (94.8)	**0.006**
	3–5	73 (51.0)	70 (49.0)		26 (18.2)	117 (81.8)		68 (47.6)	75 (52.4)		11 (7.7)	132 (92.3)	
	6–8	72 (69.9)	31 (30.1)		19 (18.4)	84 (81.6)		52 (50.5)	51 (49.5)		14 (13.6)	89 (86.4)	
	≤9	159 (75.7)	51 (24.3)		50 (23.8)	160 (76.2)		128 (61.0)	82 (39.0)		32 (15.2)	178 (84.8)	
Commuting mood	Bus	182 (80.5)	44 (19.5)	**<0.001**	55 (24.3)	171 (75.7)	0.127	133 (58.8)	93 (41.2)	0.072	27 (10.7)	199 (89.3)	0.075
	Car	35 (58.3)	25 (41.7)		11 (18.3)	49 (81.7)		31 (51.7)	29 (48.2)		9 (15.0)	51 (85.0)	
	Rickshaw	84 (43.5)	109 (56.5)		38 (18.7)	156 (81.3)		97 (50.0)	97 (50.0)		17 (8.8)	177 (91.2)	
	Walk/bicycle	28 (33.3)	56 (66.7)		13 (15.5)	71 (84.5)		34 (41.0)	49 (59.0)		3 (3.6)	81 (94.4)	
	Others (train, motorcycle etc.)	30 (46.9)	34 (53.1)		7 (10.9)	57 (89.1)		33 (51.6)	31 (48.4)		10 (15.6)	54 (84.4)	
Experience of traffic congestions	No	78 (27.6)	205 (72.4)	**<0.001**	44 (15.5)	240 (84.5)	**0.019**	123 (43.5)	160 (56.5)	**<0.001**	16 (5.6)	268 (94.4)	**<0.001**
	Yes	281 (81.7)	63 (18.3)		80 (23.3)	264 (76.7)		205 (59.6)	139 (40.4)		50 (14.5)	294 (85.5)	

Bold faces are significant at 5% significance level.
* p-value is calculated from chi-square test.

hours at the office felt musculoskeletal pain, while about 54 percent of participants had health complains who worked regular hours.

3.6. The result from the multilevel logistic model

The adjusted odds ratio using logistic models with a random intercept for banks is presented in Table 6. Each bank's intercept is allowed to vary at random. The adjusted odds ratio (AOR) is the conditional odds ratio for employees who have the same bank or banks with identical random effects while holding the factor constant. We utilized logistic regression models to find daily travel and work-related characteristics that were related to SHC among all bank workers (Table 6). We look at the variables in the full model that were shown to be significant in the descriptive analysis with p-values less than 0.05. The likelihood ratio test ($p = 0.001$) indicated that the multilevel model was well-fitted to the data.

The combined analysis revealed that people over the age of 50 were about two times more likely to experience musculoskeletal pains (AOR = 2.01, 95 percent CI = 0.71–5.91) and 1.89 times more pseudo neurological disorders (AOR = 1.89, 95 percent CI = 0.77–4.86). Musculoskeletal pains and flu were more common in female employees (AOR = 2.39, 95 percent CI = 1.57–3.69 and AOR = 1.84, 95 percent CI = 1.18–2.87, respectively). In compared to normal weight, obesity had a higher one-month prevalence of musculoskeletal pains (AOR = 2.36, 95

Table 6. Result from multilevel logistic model.

Factors	Reference	Musculoskeletal pain	Flu	Pseudo neurology	Gastrointestinal problem
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Age- 31-40	20–30	1.04 (0.62–1.75)	0.98 (0.56–1.75)	1.19 (0.76–1.86)	1.00 (0.46–2.32)
Age- 41-50	20–30	1.23 (0.61–2.49)	0.65 (0.29–1.39)	1.14 (0.78–2.58)	1.07 (0.41–2.86)
Age- 50+	20–30	**2.01 (0.71–5.91)**	1.30 (0.44–3.58)	**1.89 (0.77–4.86)**	0.78 (0.15–3.30)
Gender- Female	Male	**2.39 (1.57–3.69)**	**1.84 (1.18–2.87)**	0.90 (0.64–1.28)	1.70 (0.95–3.05)
BMI-Cat- Obese	Normal	**2.36 (1.04–5.61)**	1.51 (0.64–3.64)	1.61 (0.79–3.38)	1.40 (0.48–3.64)
BMI-Cat- Overweight	Normal	0.97 (0.65–1.44)	0.95 (0.62–1.47)	1.01 (0.72–1.42)	1.18 (0.67–2.08)
Marital- Unmarried	Married	0.61 (0.35–1.07)	0.98 (0.52–1.78)	1.21 (0.75–1.97)	0.54 (0.18–1.37)
Diabetes-yes	No	1.16 (0.63–2.17)	**1.93 (1.02–3.55)**	1.29 (0.75–2.23)	**2.85 (1.30–6.05)**
Office hours- Extended (>9 h)	Regular (8–9 h)	1.50 (1.03–2.22)	1.37 (0.91–2.07)	1.15 (0.83–1.61)	1.43 (0.83–2.48)
Average commute time- 16–30 min	≤15 min	1.06 (0.61–1.87)	1.19 (0.61–2.39)	0.90 (0.54–1.49)	**0.30 (0.09–0.92)**
Average commute time- 31–60 min	≤15 min	**6.35 (3.37–12.26)**	1.23 (0.57–2.66)	1.35 (0.76–2.38)	**2.01 (0.81–5.28)**
Average commute time-More than 1 h	≤15 min	**7.29 (3.58–15.21)**	**2.72 (1.22–6.27)**	1.56 (0.84–2.92)	**1.88 (0.69–5.41)**
Commuting Mood- Car	Bus	**0.40 (0.20–0.82)**	0.84 (0.37–1.77)	0.79 (0.42–1.46)	1.53 (0.60–3.62)
Commuting Mood-others (Motorcycle/Train etc.)	Bus	**0.26 (0.14–0.49)**	**0.45 (0.17–1.01)**	0.82 (0.46–1.47)	**1.79 (0.75–4.02)**
Commuting Mood- Rickshaw	Bus	**0.39 (0.22–0.69)**	0.99 (0.53–1.85)	0.97 (0.59–1.58)	1.19 (0.53–2.63)
Commuting Mood-Walk/bicycle	Bus	**0.50 (0.24–1.04)**	1.00 (0.41–2.34)	0.69 (0.36–1.32)	0.58 (0.12–2.12)

Bold faces are significant at 5% significance level.

percent CI = 1.04–5.61). There was a significant relationship between comorbidity (e.g., diabetes) and flu (AOR = 1.93, 95 percent CI = 1.02–3.55) and gastrointestinal issues (AOR = 2.85, 95 percent CI = 1.30–6.05).

All related commuting characteristics are correlated with the occurrence of musculoskeletal discomfort, according to the findings of a multilevel logistic model. The prevalence of musculoskeletal pains was 6.35 and 7.29 times greater among participants who commuted for less than 15 min, 31–60 min, and more than 60 min (AOR = 6.35, 95 percent CI = 3.37–12.26 and AOR = 7.29, 95 percent CI = 3.58–15.21, respectively). Employees who commuted by private vehicle (AOR = 0.40, 95 percent CI = 0.20–0.82), motorcycle/train (AOR = 0.26, 95 percent CI = 0.14–0.49) or rickshaw (AOR = 0.39, 95 percent CI = 0.22–0.69) had a 60–75 percent lower risk of musculoskeletal complaints than those who commuted by public bus. We also found that individuals who had a long commute (more than 60 min) were 2.72 times higher odds of flu complaints (AOR = 2.72, 95 percent CI = 1.22–6.27). Similarly, riders on motorcycles and trains had a 55 percent lower odds of flu complaints than bus riders (AOR = 0.45, 95 percent CI = 0.17–1.01). However, we found inconsistent results when it came to gastrointestinal issues. Those who commuted 15–30 min had a 70 percent lower odds of gastrointestinal disorders than those who had a commute less than 15 min (AOR = 0.30, 95 percent CI = 0.09–0.92), whereas those who commuted 31–60 min had a two-fold higher risk (AOR = 2.01, 95 percent CI = 0.81–5.28). The results of the Hosmer–Lemeshow test (p = 0.53) supported the goodness of fit of the multiple logistic model presented in Table 6.

4. Discussion

This study found a high-level one-month prevalence of SHC among bank employees in Dhaka city. Among 29 SHC, more than half of the participants reported tiredness followed by LBP, anxiety, gas discomfort, and depression. In five subgroups of SHC, higher prevalences of pseudo-neurological problems and musculoskeletal pains were observed. We found a significant association between older age, marriage, and higher prevalence of musculoskeletal pains while the presence of comorbidity was associated with more complaints of gastrointestinal problems. All commute related factors were significantly associated with all subgroups of SHC, though work-related factors were associated with musculoskeletal pains and pseudo neurological problems. When we adjusted for confounding variables, we found a stronger association between commuting factors and subgroups of SHC.

However, our study findings were consistent with the findings of many previous studies. A study conducted in urban China revealed that extreme commute time (≥1 h per day) was associated with a lower level of subjective well-being among employees [23]. In our study, we found a significantly strong association between higher daily commuting time and a high prevalence of SHC among bank employees in Dhaka city. We also found commuting distance played an important role when determining the association with SHC. Employees commute more than 3 km complained more frequently about SHC than those commutes less than three kilometers. This result was similar to the findings of Urhonen et al.'s study among Norwegian railway workers [4]. A Survey conducted in a European country also found a clear association between longer commute and lower subjective health measures among the participants [24]. In our study, we observed that those who commute by bicycle or on foot less likely encountered SHC, however, bus commuters are 2–3 times more frequently complained SHC when compare with train, rickshaw or car users. A British study revealed that train and bicycle commuters showed a higher subjective wellbeing state than public transport (e.g., Bus) commuters [25]. The results of our study are also consistent with other studies' findings [26, 27]. Furthermore, a 2018 systematic review and meta-analysis concluded that active commuting reduces both subjective and objective health risks [28]. On the other hand, our study found traffic congestion as a strong predictor of musculoskeletal pains, flu, pseudo-neurological and gastrointestinal problems. The association between traffic congestion experience and SHC was also statistically strongly significant. In line with our study findings, a recent review concluded that long commute and congestion have negative effects on commuters' SHC [29].

When the association between work-related factors and SHC was explored, we found job duration was associated with musculoskeletal pains and pseudo-neurological problems. A systematic review and meta-analysis concluded that the prevalence of musculoskeletal pains increases with job duration [30]. Participants with more than ten years of job experience had more frequently complained about musculoskeletal pains and pseudo-neurological problems than other participants in our study. However, working hour per day was only associated with musculoskeletal pains. Similar studies conducted among office workers found an association between job duration and working hours per day with musculoskeletal pains [31, 32].

4.1. Strength and limitation

This is the first study in Bangladesh to look at the relationship between daily commute and SHC among office workers. The study's strength was investigating a very homogeneous group of bank employees who suffered minor physical strain at work and had a moderately high response rate. The bank employees in this study all did office work and had a comparable work exposure status. This allowed for a reduction in the impact of work-related confounding factors in the workplace. When writing on keyboards and papers, however, bank personnel may have been exposed to frequent motions. Although we did not collect data on this, the amount of time spent writing on a keyboard or on paper may fluctuate from worker to worker. More valuable data on such exposure would have increased the study's quality. The study would have benefited from information about job and stressors outside of the office. Furthermore, the likelihood of information and recall bias in self-reported data cannot be ruled out. Bank employees on sick leave were unable to participate in this study, but they were in the minority, therefore the outcome was unlikely to be influenced. Because this study focused solely on bank employees, the findings should be applied with caution to other office workers in other work situations. To fully comprehend the association between daily commute and health complaints, more research on different experts with multiple assessments and correspondents is recommended.

5. Conclusion

Health complaints due to commuting to workplace was found to be very common among bank personnel in Dhaka. The utilization of public transportation (e.g., the bus) and the length of time spent commuting were both related to the high prevalence of health complaints. The presence of traffic congestion was also revealed to be a strong predictor of SHC. Bicyclists, on the other hand, are less likely to report SHC in this study. Reduced commuting time, more flexible working hours, and work from home a few days a week could all help to lessen commuting strain. Changing commuting moods (for example, by riding a bicycle) could also help office workers lessen their health concerns.

Declaration

Author contribution statement

Mohammad Ali: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Zakir Uddin and Gias U Ahsan: Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Ahmed Hossain: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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